Low Cost Digital Sun Sensor

The Digital Sun Sensor (DSS) is an autonomous accurate sun tracker of a new generation for attitude control from low Earth orbit missions to deep space exploration (50 AU). This equipment provides 2-axis attitude information to the attitude control subsystem at a very high frame rate so that it is suitable also for application in spinning spacecraft.

Telemetry via RS422 hardware interface; protocol can be easily tailored to meet mission requirements (e.g. RS232, OBDH,…).

DSS Proven Technologies for Accurate Measuring

Accuracy and reliability of this equipment is made possible by means of:

- Rad-tolerant and Low Noise Active Pixel Sensor
- Latch up protection
- Sun image digital processing with dark current mitigation algorithm

Performances

<table>
<thead>
<tr>
<th>Sun distance:</th>
<th>up to 50 AU</th>
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<tbody>
<tr>
<td>Field of view:</td>
<td>up to 128° x 128°</td>
</tr>
<tr>
<td>Output data rate:</td>
<td>&gt;400Hz</td>
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<tr>
<td>Accuracy budget:</td>
<td>bias error=0.02° at 2σ (with calibration) in entire Field of View random error=0.01° at 3σ</td>
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Via telemetry the sensor provides continuously:

- Pixel coordinates of sun spot
- Unit specific scale factors derived from on-ground calibration for residual error correction
- Status information and housekeeping for performance monitoring

TNO TPD delivers innovative and complete solutions for large companies, SMEs and the government. Our fields of knowledge are: sound and vibration, models and processes, and imaging and instrumentation. Projects, both national and international, vary from system development to consultancy.
### Environmental Characteristics
- **Operating temp:** -50°C to +80°C
- **Vibration:** typical ARIANE 5 environment

### Life Span
- **15 years (GEO)**

### Mechanical Interface
<table>
<thead>
<tr>
<th></th>
<th>Without DC/DC converter</th>
<th>With DC/DC converter</th>
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<tbody>
<tr>
<td><strong>Mass:</strong></td>
<td>&lt;0.32 kg</td>
<td>&lt;0.50 kg</td>
</tr>
<tr>
<td><strong>Dimensions (w x l x h)</strong></td>
<td>130 x 120 x 45 mm</td>
<td>130 x 120 x 65 mm</td>
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### Electrical Interface
- **Typical power consumption:**
  - Without DC/DC converter: 1W
  - With DC/DC converter: 1.7W
- **Supply voltage range:**
  - Without DC/DC converter: From 7V to 10V
  - With DC/DC converter: From 20V to 50V
- **Reliability:**
  - Without DC/DC converter: 740 Fits
  - With DC/DC converter: 850 Fits
- **Output data:**
  - RS422 8 bits serial link
- **Temperature sensing included:**

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